

REMARKS

This amendment is filed in response to the Office Action dated October 17, 2008. In the October 17, 2007 Office Action, the Examiner:

- Rejects claims 1-9, 12-16, 19-23, and 26-28 under 35 U.S.C. § 102 (e) as being anticipated by Baum et al., (U.S. Patent No. 6,869,638) (“Baum”); and
- Rejects claims 10, 11, 17, 18, 24, and 25 under 35 U.S.C. § 103 (a) as being obvious over *Baum* in view of Metzner et al., (U.S. Patent Application Publication 2003/0232506 (“Metzner”).

Applicants respectfully traverse. Reconsideration of the claims in light of the following remarks is requested. Upon entry of this amendment Claims 1 – 6, and 8 – 25 are pending and under consideration. Claims 1, 12 and 19 have been amended. Claims 26-28 are canceled. Applicant respectfully submits that no new matter is added by this amendment.

Applicants have not dedicated or abandoned any unclaimed subject matter and moreover have not acquiesced to any rejections made by the Patent Office. Applicants reserve the right to pursue prosecution of any presently excluded claim embodiments in future continuation and/or divisional applications.

Claim Amendments

Claims 1, 12, and 19 has been amended to recite a specific temperature range for the ozone introduction step. Support for these amendments is found in at least page 7 line 22-23 of the subject International PCT Application. Applicants submit that no new matter has been added in this amendment.

Claim Rejections - 35 U.S.C. § 102

The Examiner rejected claims 1-9, 12-16, 19-23, and 26-28 under 35 U.S.C. § 102 (e) as being anticipated by Baum et al., (U.S. Patent No. 6,869,638) ("Baum"). Applicants respectfully traverse.

For an anticipation rejection under 35 U.S.C. § 102 to be proper, a single reference must disclose each and every element of a claim. *In re Paulsen*, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994); M.P.E.P. § 2131.

Claims 2-9 depend from claim 1; claims 13-16 depend from claim 12; and claims 20-23 depend from claim 19. Claims 26-28 have been canceled.

Amended claim 1, 12, and 19 states in relevant part:

(iii) introducing ozone into the reaction chamber
wherein the temperature of the wafer is below 300°C;
(emphasis added)

Baum does not teach "introducing ozone into the reaction chamber wherein the temperature of the wafer is below 300°C." In fact, Baum does not teach using any particular temperature for the oxidizing step. Baum teaches only a temperature range for the entire process, not the oxidizing step.

Baum generally teaches that, "The deposition of the dielectric thin films of the present invention are preferably carried out under an elevated deposition temperature range of from about 250°C to about 750°C" (Baum, column 15, lines 58-61.), which is a temperature range of 500 °C. Moreover, all of the examples given in Baum show testing performed at temperatures between a range of 350°C and 700°C, with the lowest actual values tested being 400°C. (Baum Examples and Figures 2, 4, and 6-11.) In contrast, the claims of the present invention as amended specifically teach performing the oxidizing step at below 300°C.

The only arguable overlapping range of the current claim and Baum is only the range between 250°C and 300°C. This is only a 50 degree temperature range, one tenth of the 500 degree temperature range disclosed in Baum. Applicant respectfully submits that Baum does not actually enable anyone to use, nor does Baum suggest using, the lowest tenth of its disclosed

temperature range. All of the experiments reported in Baum are performed at 400°C or higher. (Baum Examples and Figures 2, 4, and 6-11.)

Moreover, even if this range were specifically taught, Baum would not necessarily anticipate the present claims. On the issue of overlapping ranges, the Applicant draws the Examiner's attention to MPEP § 2131.03 which states:

[W]hile there was a slight overlap between the reference's preferred range (150-350 degrees C) and the claimed range, that overlap was not sufficient for anticipation. *Atofina v. Great Lakes Chem. Corp*, 441 F.3d 991, 1000, 78 USPQ2d 1417, 1424 (Fed. Cir. 2006).

The current application is even more compelling than that of the MPEP example recited above. The overlapping range in the MPEP example was in the middle of the previously disclosed range and was still found to be patentable. *Id.* Whereas in the present case, the overlapping portion exists only at the lowest ten percent of the previously disclosed range. Indeed, no examples disclosed in Baum actually use anything lower than the bottom fifth of the disclosed range. (See Baum Examples and Figures 2, 4, and 6-11.) Applicant respectfully submits that the overlap is not sufficient for anticipation, and that the temperature range recited in the claims of the present invention as amended is patentable over Baum.

Regarding the oxidizing step, Baum teaches, "Oxidizing gases useful for the broad practice of the present invention include, but are not limited to, O₂, N₂O, NO, H₂O, and O₃. More preferably, the oxidizer used comprises N₂O." (Baum, Col. 15, lines 54-57) In other words, although Baum discloses that O₃ may be used, Baum gives no examples of using O₃ as the oxidizer in an ALD process, nor does Baum disclose carrying out an oxidizing step with O₃ at temperatures of below 300 °C as recited in the amended claims. The only ALD examples that Baum disclose all use N₂O as the oxidizer. Baum discloses four examples of an ALD process, and in all four examples N₂O is used as the oxidizer. (Baum, Col. 14, lines 45-53.)

Indeed, when studying the examples of Baum it is clear that Baum does not use ozone as the oxidant, and in fact Applicants submit that the disclosure of Baum actually *teaches away* from using ozone. This is because traditionally, oxygen gas and steam have been preferred oxidants in an ALD processes. Although ozone has been recognized as an oxidant, it is disfavored due to its relatively high instability. As explained in the current application, "oxygen

gas requires operating temperatures of around 400°C, ozone permits operating temperatures below 300°C.” (International PCT application, page 7, lines 21-23, emphasis added.)

Therefore, it is unlikely that the inventors of Baum would have considered performing an oxidizing step with ozone because Baum requires a temperature of 400°C. In fact, since ozone operates at a lower temperature process and is considered unstable at higher temperatures, it would not be suitable for use in Baums' experiments. Baum does not use ozone, nor does Baum operate at a temperature below 400°C in any of its examples.

In summary, Baum does not teach “introducing ozone into the reaction chamber wherein the temperature of the wafer is below 300°C.” Baum does not enable by any example the use of ozone. Baum does not show specific process temperatures of below 400°C in any of its examples. Applicant respectfully submits that one of skill in the art would not have been taught by Baum's broad temperature ranges and large list of oxidizers, which produces multitudes of possible combinations, to utilize an oxidizing step in an atomic layer deposition by “introducing ozone into the reaction chamber wherein the temperature of the wafer is below 300°C” as recited in Applicants amended claims. In fact, based on the experiments described in Baum, one would be taught away from the process conditions of Applicant's amended claims.

For at least the above stated reasons, independent claim 1 is not anticipated by Baum. For at least the same reasons, independent claims 12 and 19 are likewise not anticipated by Baum. Finally, the dependent claims which depend from claims 1, 12, and 19 are likewise not anticipated by Baum for at least the same reasons. Therefore, the Applicant respectfully requests that the rejections to claims 1-9, 12-16 and 19-23 be withdrawn.

Claim Rejections - 35 U.S.C. § 103

The Examiner rejected claims 10, 11, 17, 18, 24, and 25 under 35 U.S.C. § 103 (a) as being obvious over Baum in view of Metzner et al., (U.S. Patent Application Publication 2003/0232506 (“Metzner”). Applicants respectfully traverse.

The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, and (3) the level of skill in the art. *Graham v. John Deere Co.*,

383 U.S. 1, 17-18 (1966); see also *KSR Int'l Co. V. Teleflex Inc.*, 127 S.Ct. 1727, 1734 (2007). “Section 103 forbids issuance of a patent when the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR*, 127 S.Ct. at 1734 (internal quotations omitted).

Claims 10 and 11 depend from claim 1; claims 17 and 18 depend from claim 12; claims 24, and 25 depend from claim 19. As presented above, Baum does not teach an oxidizing step in an atomic layer deposition by “introducing ozone into the reaction chamber wherein the temperature of the wafer is below 300°C.” Applicant respectfully submits that Metzner adds nothing more.

When Metzner discloses forming a hafnium silicate layer, it discloses that, “The hafnium silicate layer is formed at temperatures in the range of about 325°C to about 700°C... Preferably, the hafnium silicate layer is formed at about 600°C.” (Metzner, paragraph [0073].) Therefore, the disclosed temperature range of Metzner, even at its lowest end, is above the claimed temperature range of “below 300°C.”

For the foregoing reasons, Baum and Metzner, either alone or in combination, fail to teach each and every limitation of the claimed invention. Therefore, the Applicant respectfully requests that the rejections to claims 10, 11, 17, 18, 24, and 25 be withdrawn.

CONCLUSION

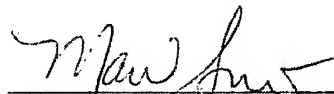
Based on the foregoing, Applicant submits that Claims 1 – 6, and 8 – 25 are in condition for allowance. An early indication of the same is therefore respectfully requested. If any matters can be resolved by telephone, the Examiner is invited to call the undersigned attorney at the telephone number listed below. No fees beyond those being submitted concurrently herewith are believed due. However, the Commissioner is authorized to charge any additional required fees,

or credit any overpayment, to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310
(Order No. 067538-5171-US).

Respectfully submitted,

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Date:



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